# Rock Compositions defined from Immobile Trace element geochem.

Vanadium is a proxy for Fe content; more V = more mafic
I selected the purple group (andesitic) from the V vs Sc plot
Lavas and porphyries are usually compositionally homogeneous, and plot as very tight clusters on these immobile trace element plots. Volcaniclastics can have quite a mixed provenance and will be much more scattered on these plots. The purple group is quite mafic, but has a mixed provenance.
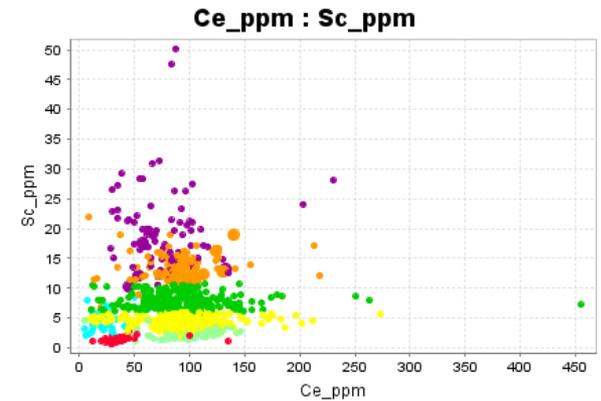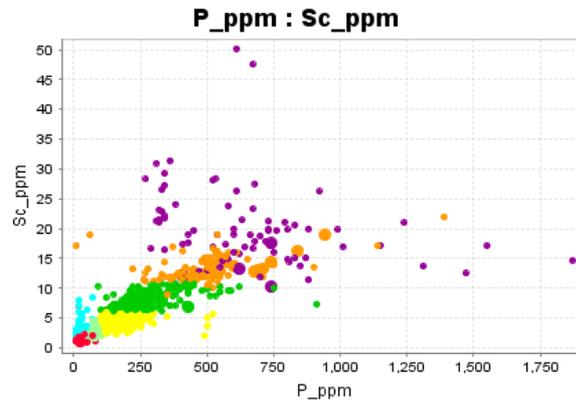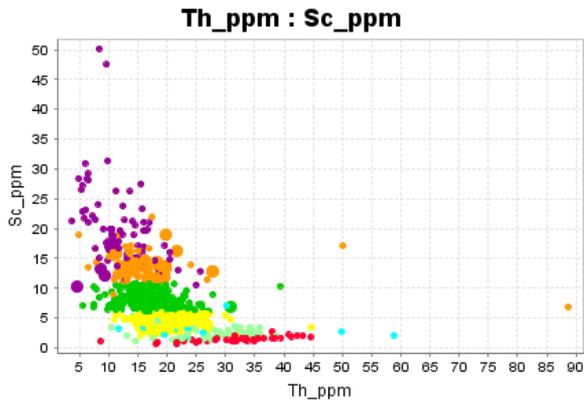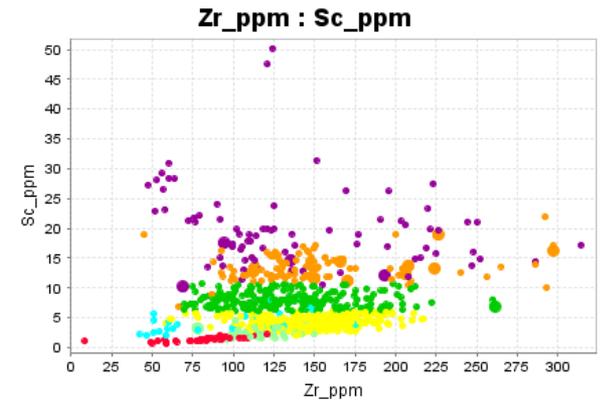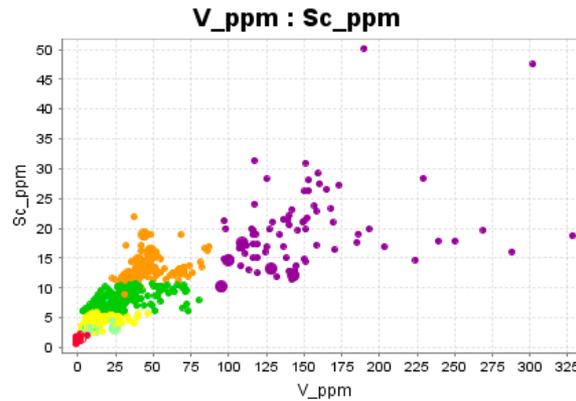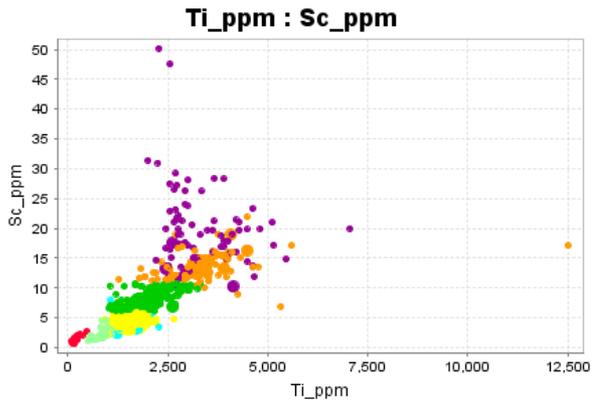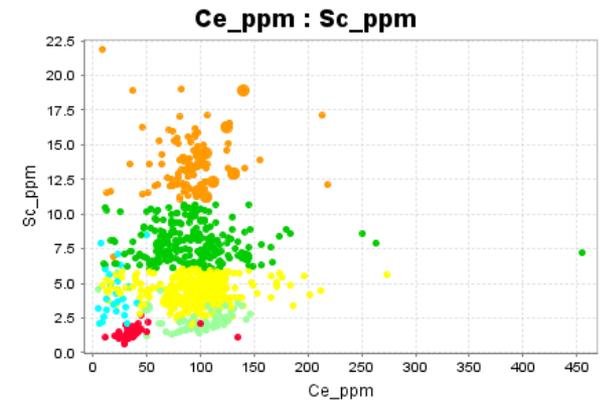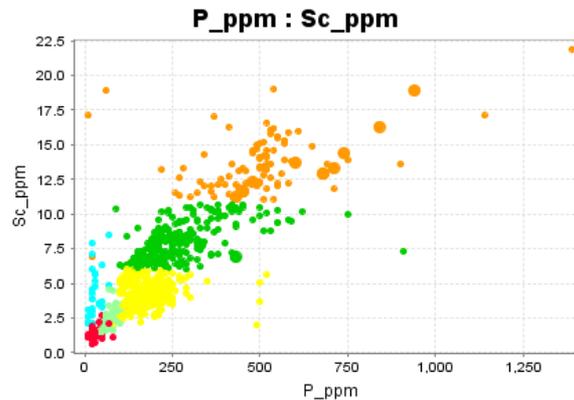
# Rock Compositions defined from Immobile Trace element geochem.

The large point size are the samples from the underground holes; the smaller point sizes are from the Lake Rosebery drill holes.

The purple (andesitic) group has been removed; see what is left.

On the Sc vs Ti plot, from the orange group moving back towards the origin, these samples are becoming progressively more felsic. With a point density contour overlay, the orange group looks like a discrete dacitic population.

Colour
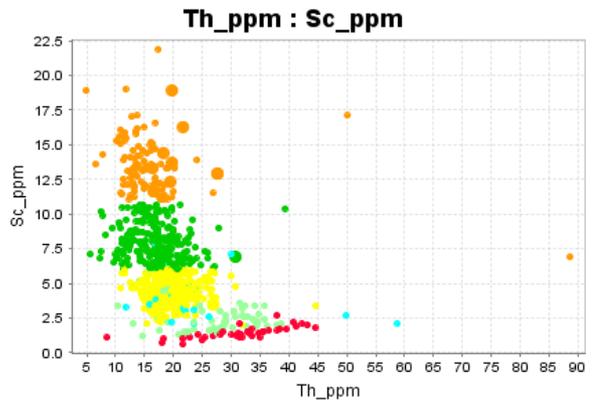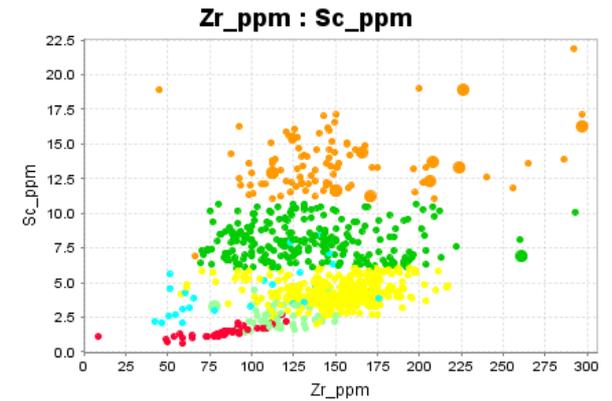- Andesite
- Dacite
- High-Th Rhyolite1
- High-Th Rhyolite2
- Low_P Rhyolite
- Rhyodacite
- Rhyolite
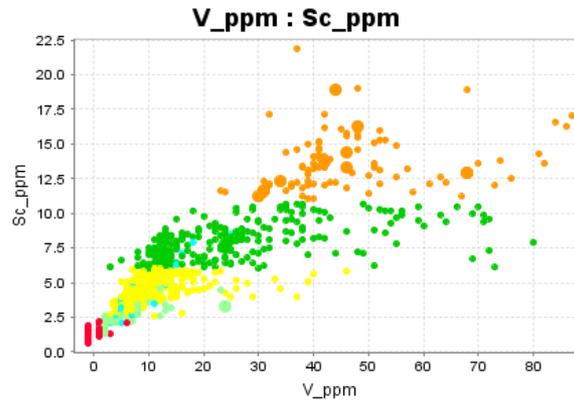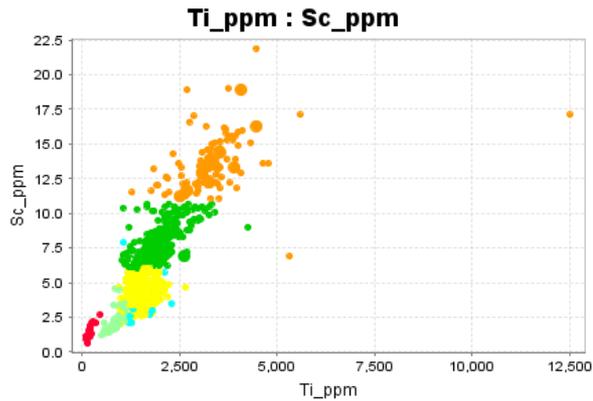
# Rock Compositions defined from Immobile Trace element geochem.

The green population was defined from the Sc vs Ti plot, and the green and yellow groups also are clearly separated on the Sc vs P plot. However they could have been defined quite differently on the Sc vs Zr plot. There is clearly quite a range of compositions from the green to yellow groups, and the distinction between them is subjective. This is likely to be an intercalated volcaniclastic package.

Colour
- Andesite
- Dacite
- High-Th Rhyolite1
- High-Th Rhyolite2
- Low_P Rhyolite
- Rhyodacite
- Rhyolite
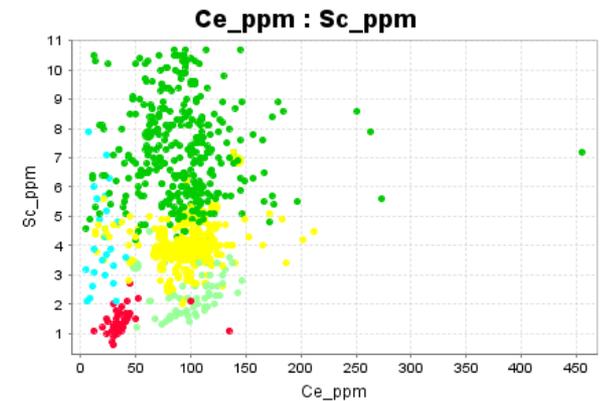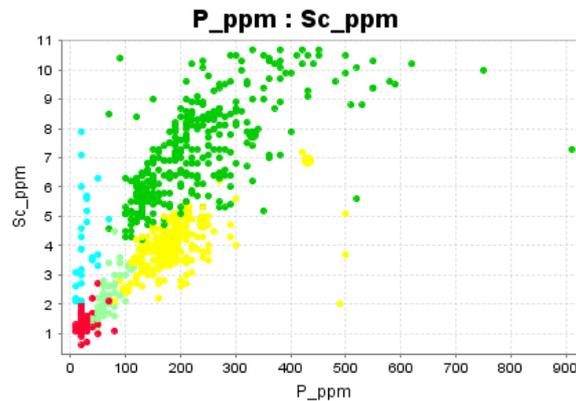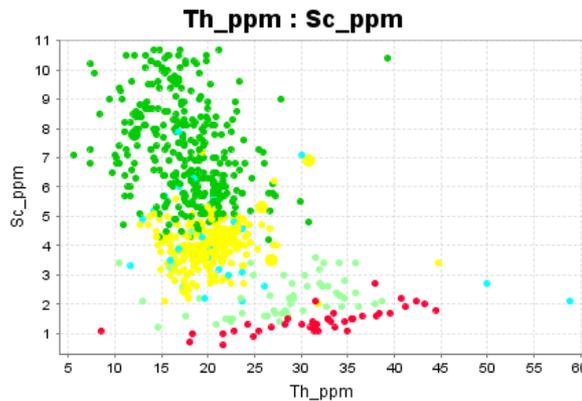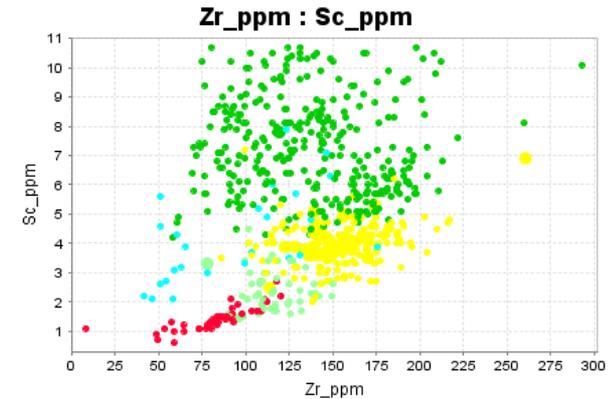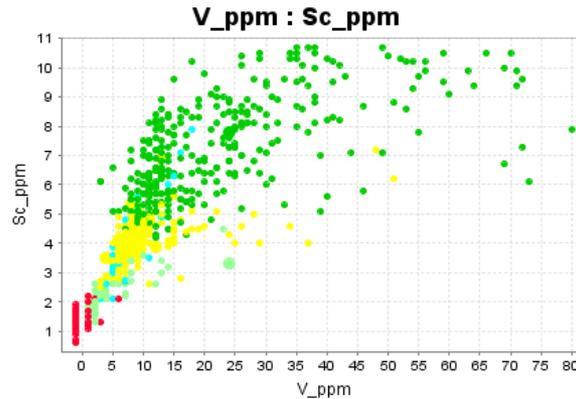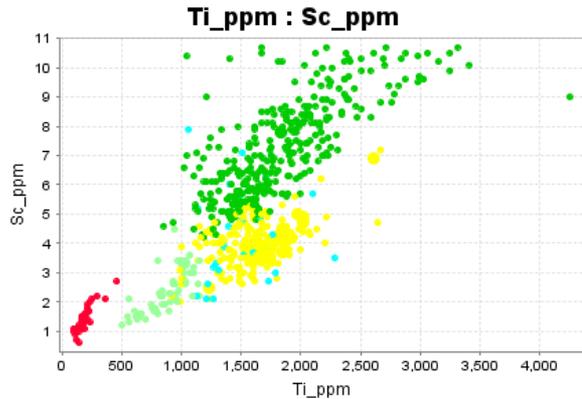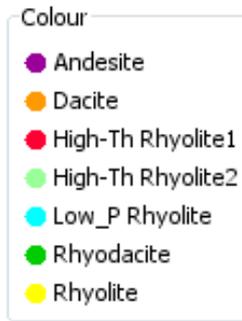
# Rock Compositions defined from Immobile Trace element geochem.

The red and pale green groups are really distinctive. They have VERY low Sc and Ti (ie, very felsic), low Zr, but high Th. The pale blue group has very low P.
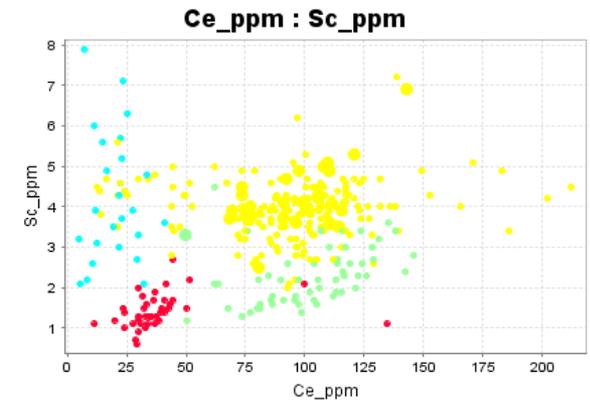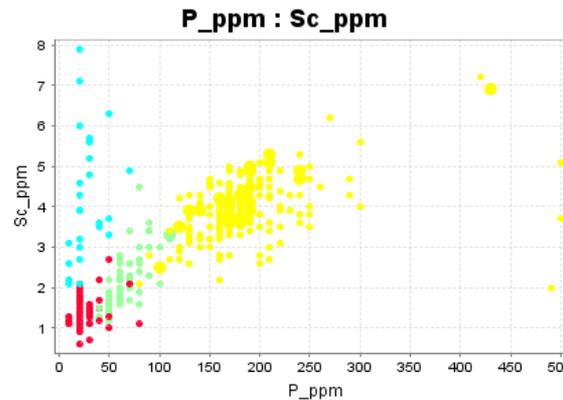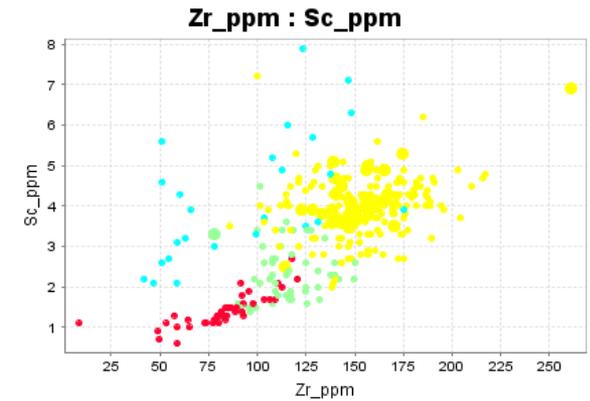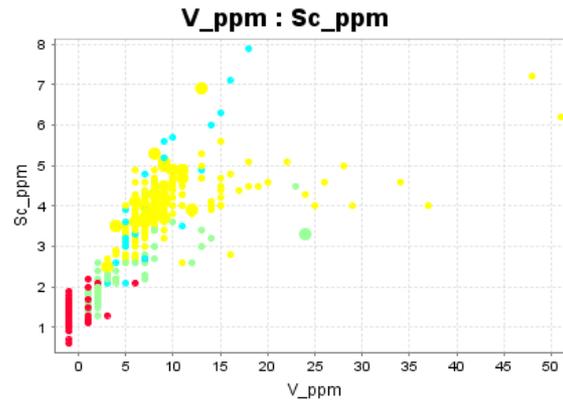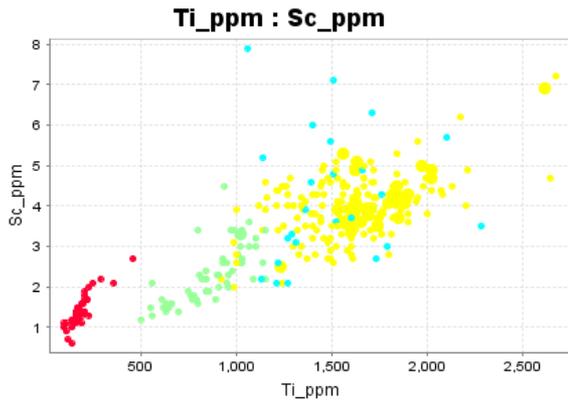
# 3D view of defined Rock Compositions.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. Note that all the pale green and red points are in the footwall of the Rosebery Fault. Compositionally, the footwall rocks are very distinct from the host sequence and the Mount Black Volcanics.
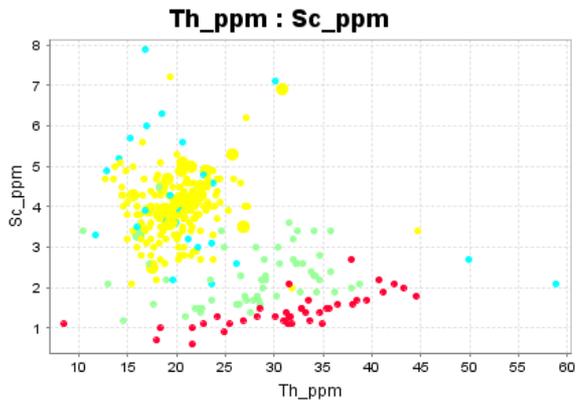The northern extension of the Rosebery sulfide position is along the boundary between the green and yellow groups, between the two fault surfaces.
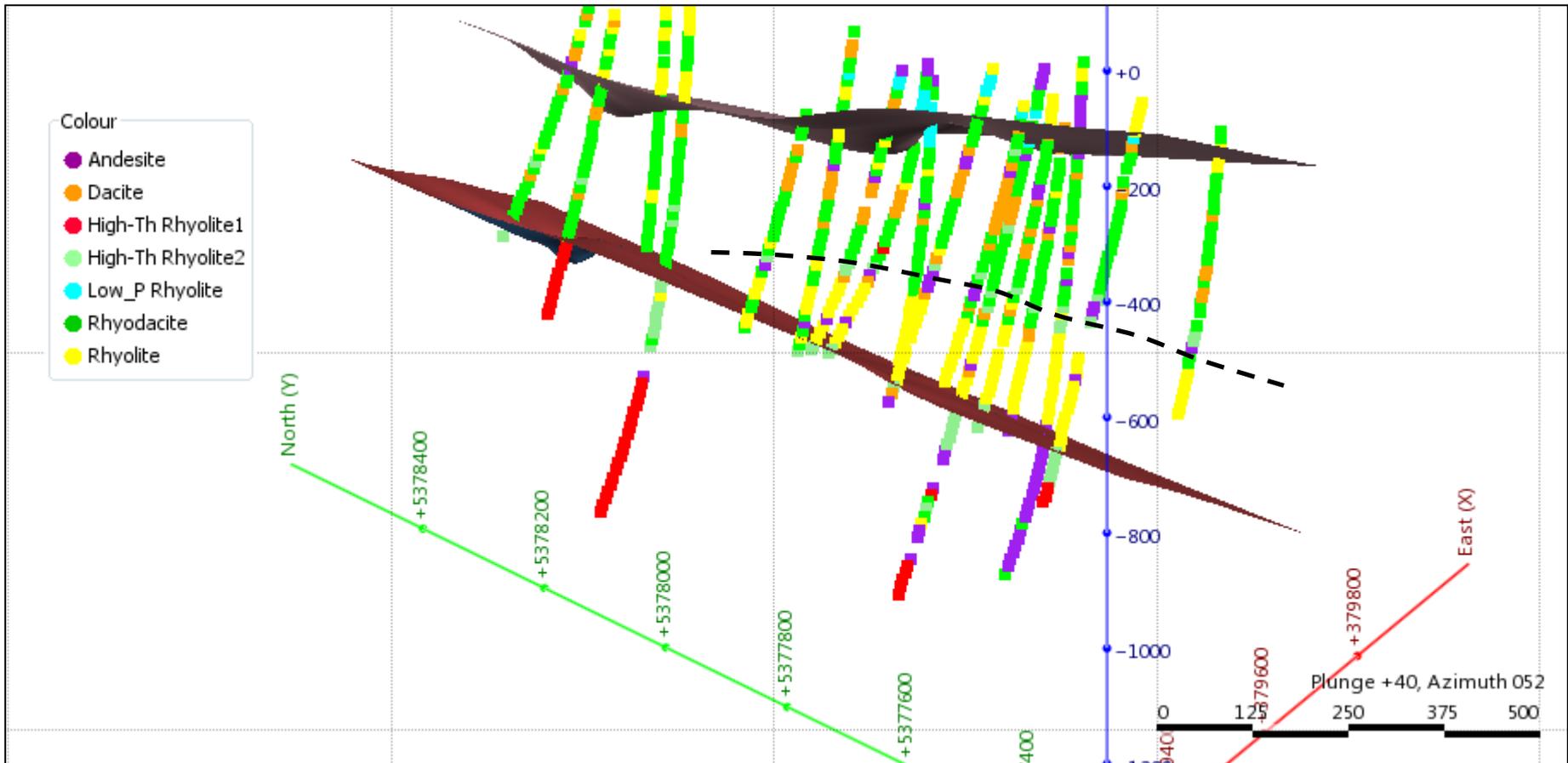
# Alteration defined from K/Al vs Na/Al molar ratio plot.

This is the K/Al vs Na/Al molar ratio plot. Muscovite has a K/Al ratio of 0.33 on the y axis; phengite 0.45 on the Y axis, albite 1.0 on the X axis. The projected positions of unaltered basalt, andesite, dacite, rhyolite are shown for reference. Note nearly all the points are between albite-muscovite and albite-phengite tie lines..



Feldspar Na-K GER Diagram
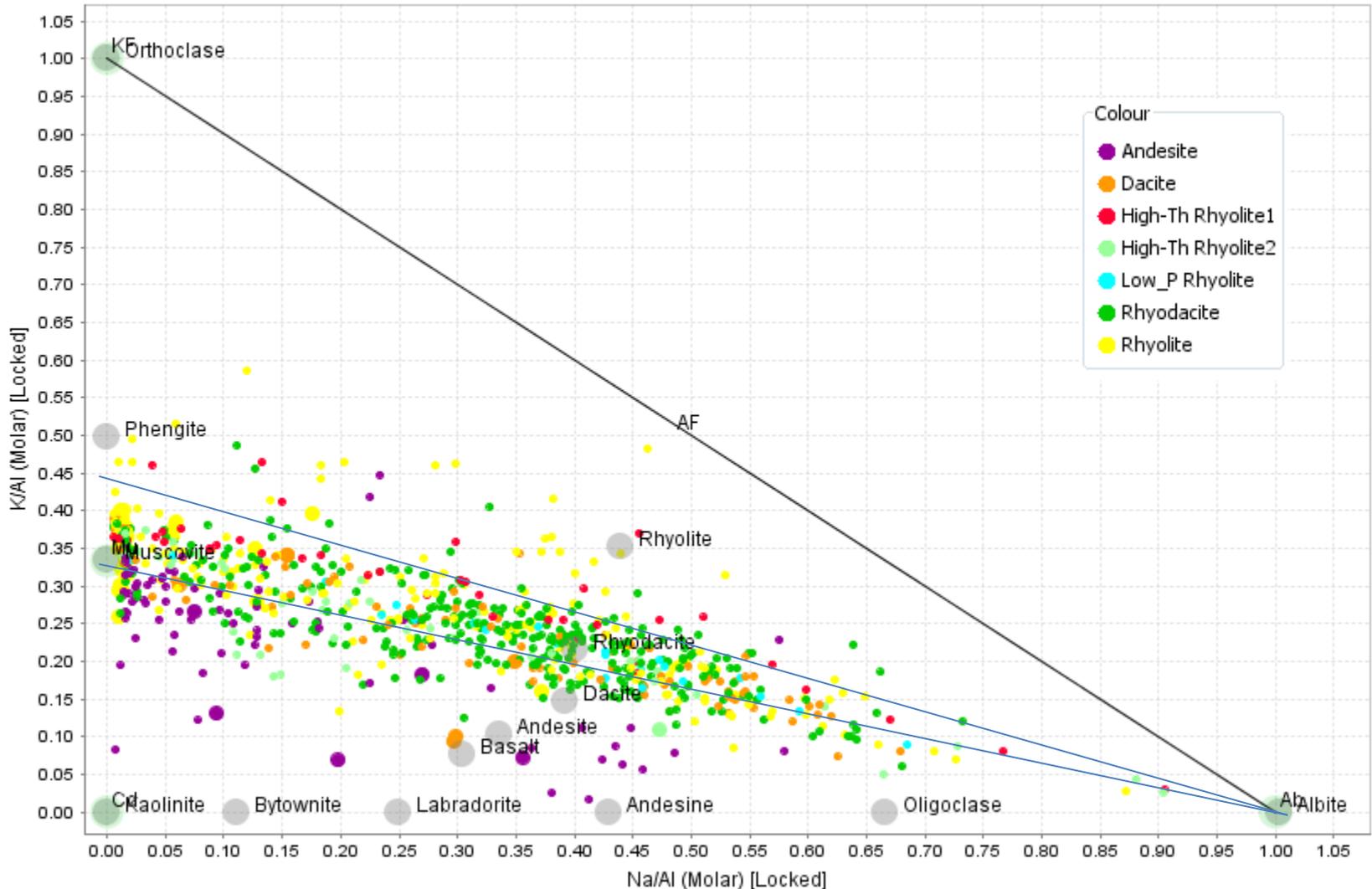
# Alteration defined from K/Al vs Na/Al molar ratio plot.

This is the classification of the alteration defined from the K/Al vs Na/Al molar ratio plot.



Feldspar Na-K GER Diagram
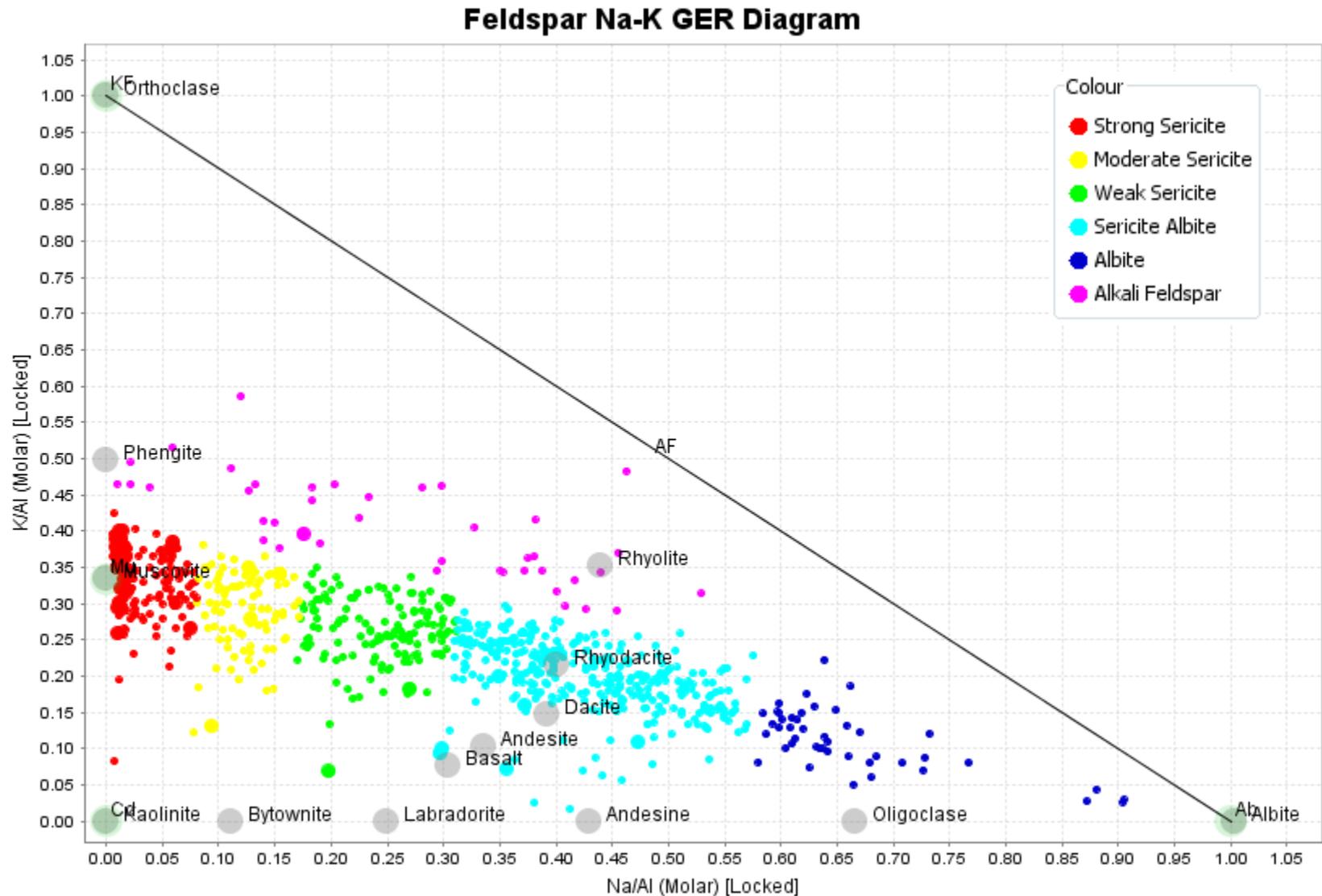
# 3D view of defined Alteration Signatures.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. The northern extension of the The dashed line is the extension of the Rosebery sulfide position.
Note the extent of Na-depleted rocks (red, pink, yellow) beneath the Rosebery Fault.
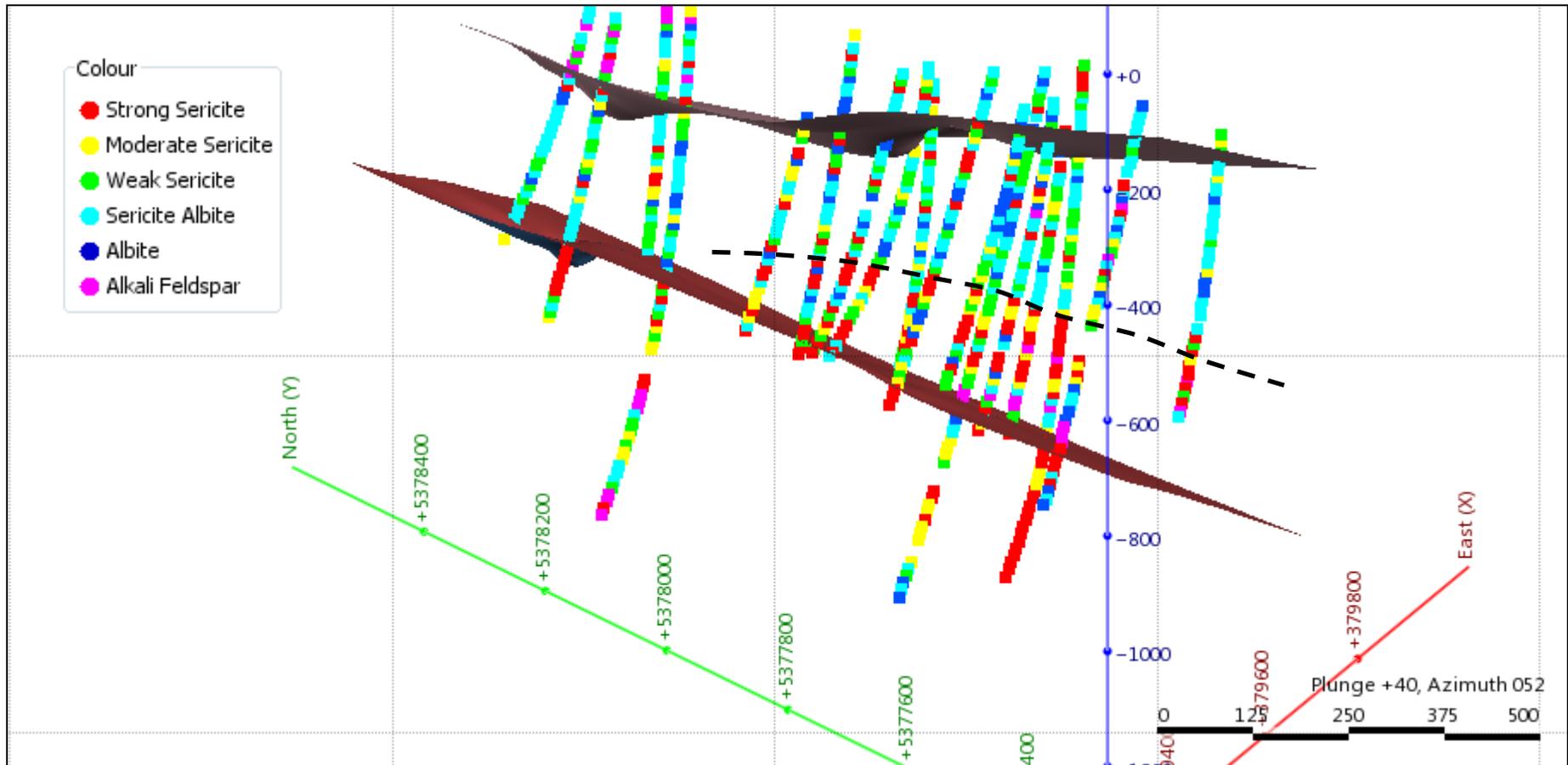
# Probability plots of pathfinder elements.

These probability plots show the partitioning of pathfinder elements with respect to different alteration types. S, As, Sb and Tl distributions are all strongly biased towards the more acid alteration types. The As and Sb levels are an order of magnitude lower than Hellyer – Que River.
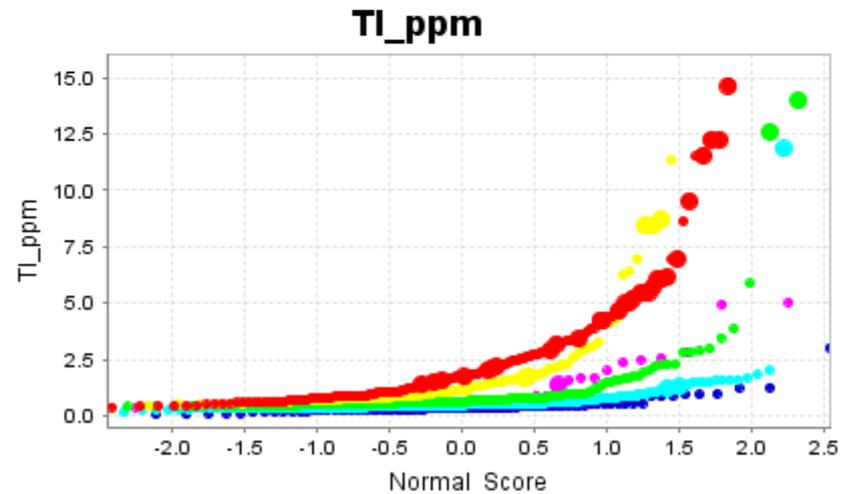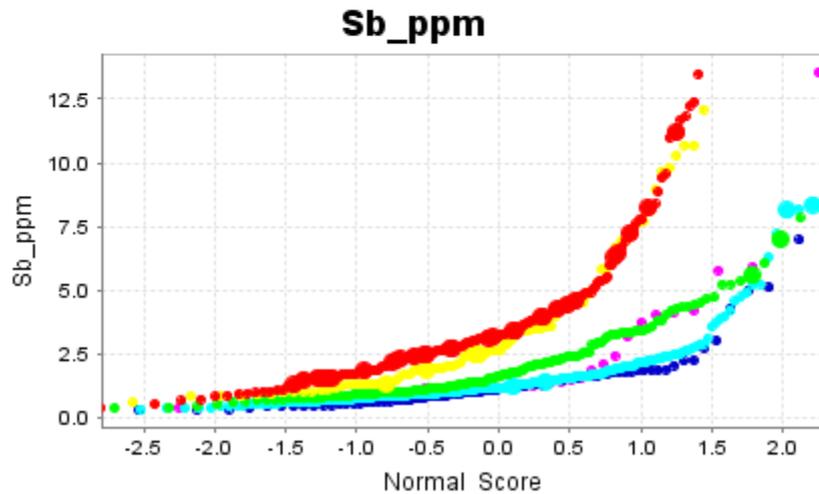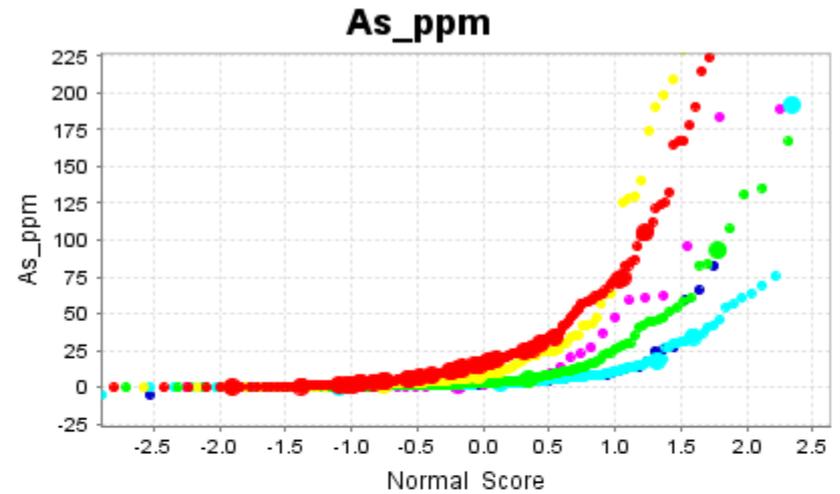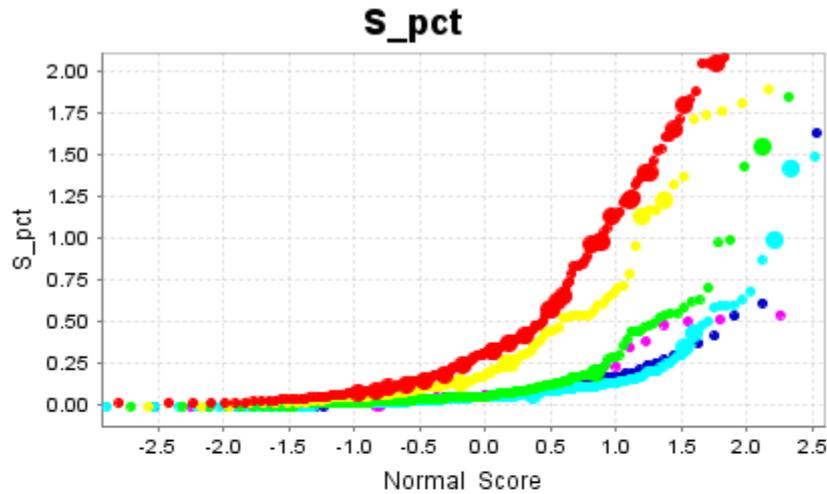
# Probability plots of pathfinder elements.

These probability plots show the partitioning of pathfinder elements with respect to different alteration types. Bi, Mo, Se and Te levels here are quite low. The trace element signatures are consistent with Rosebery being a relatively low temperature system.
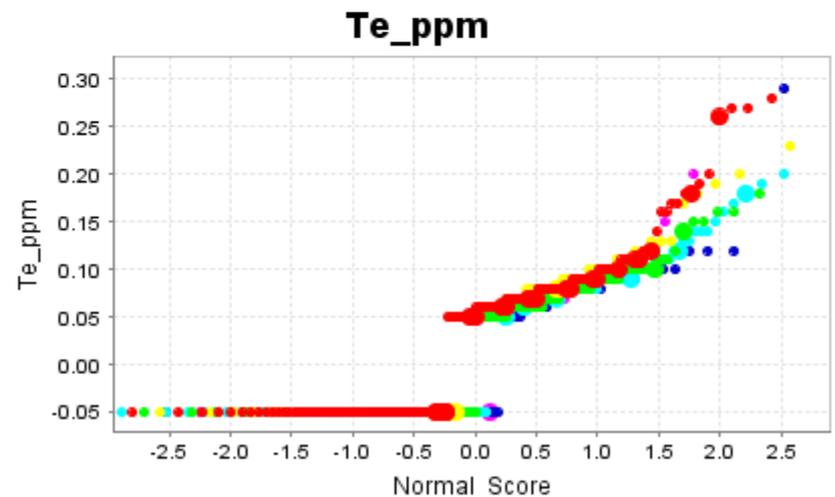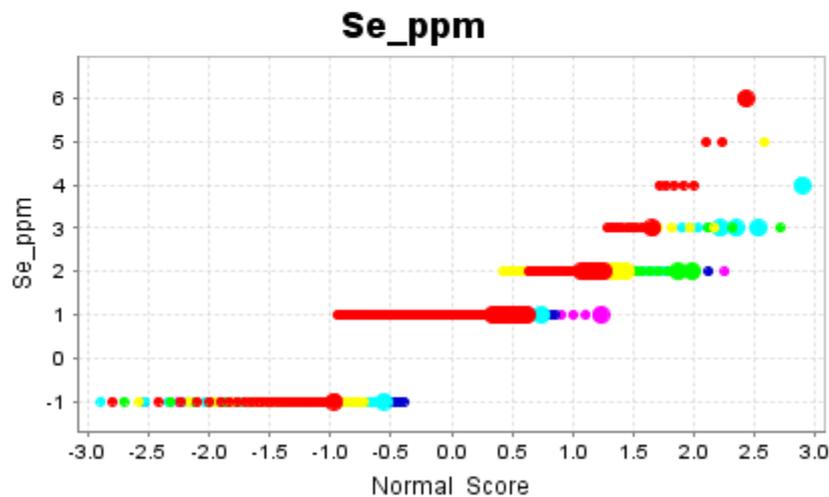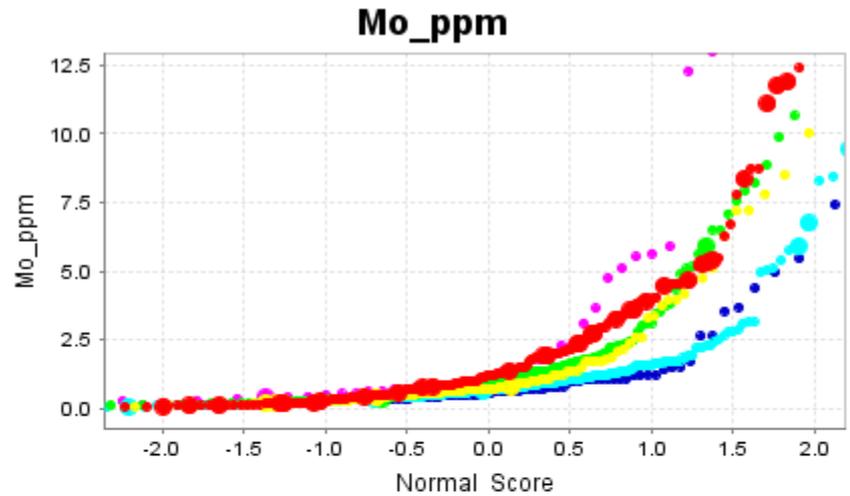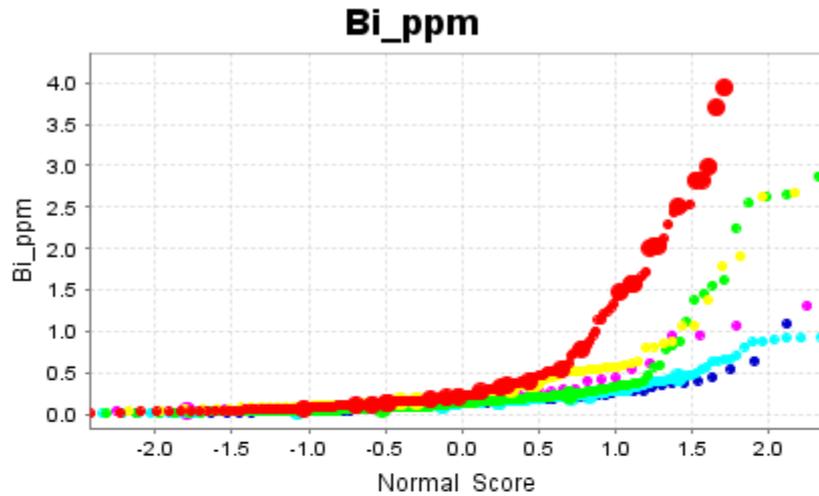
# Potassic elements.

Potassium shows very linear trends with Ba, Cs, Rb and Tl. The scatter of points above the linear K vs Ba trend will be the samples that contain Barite. The cloud of points above the linear K vs Tl trend will be the samples that have thallium-bearing pyrite.
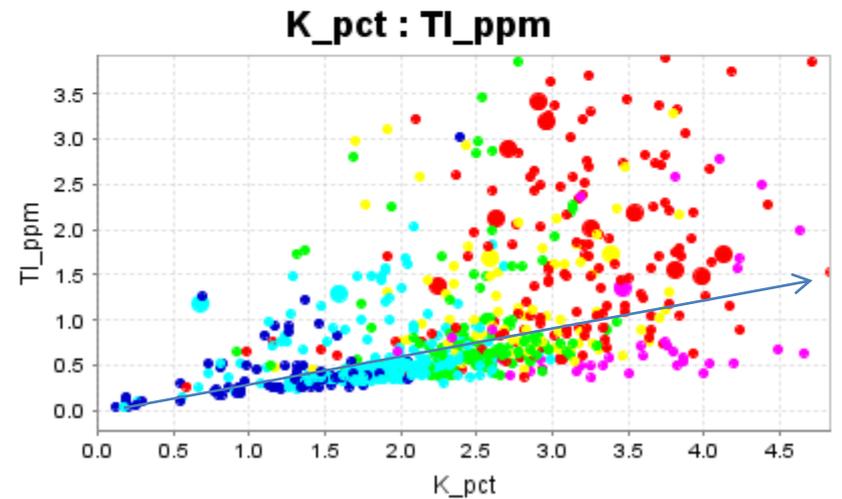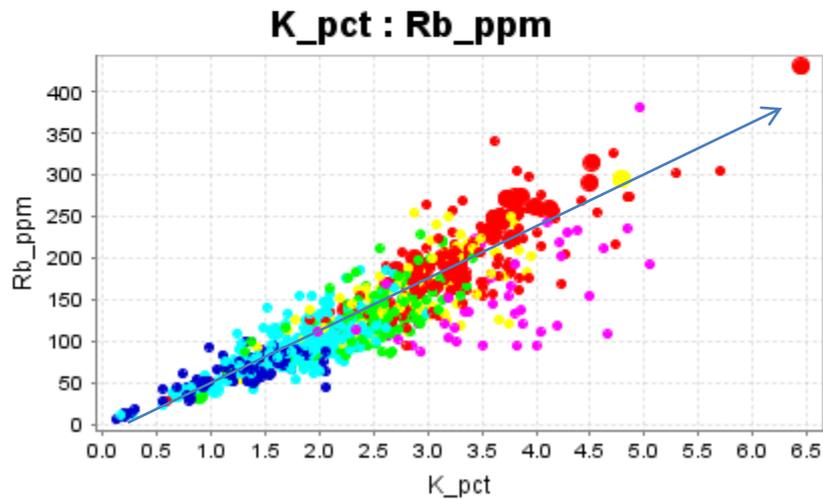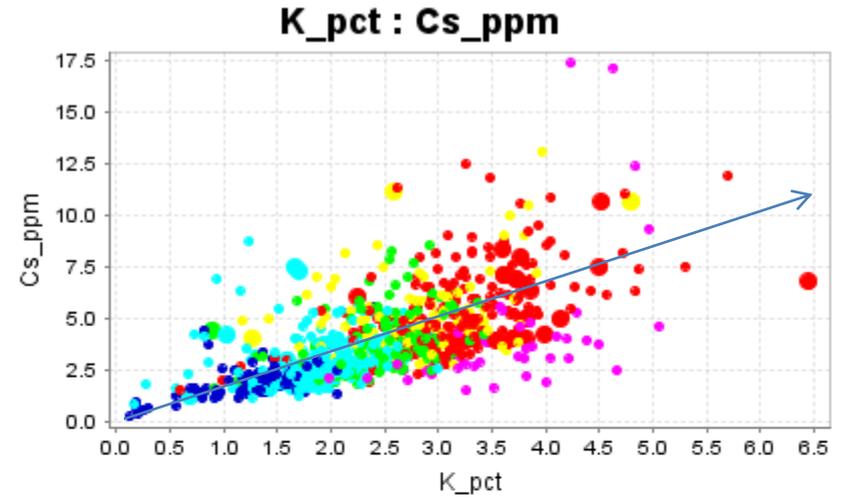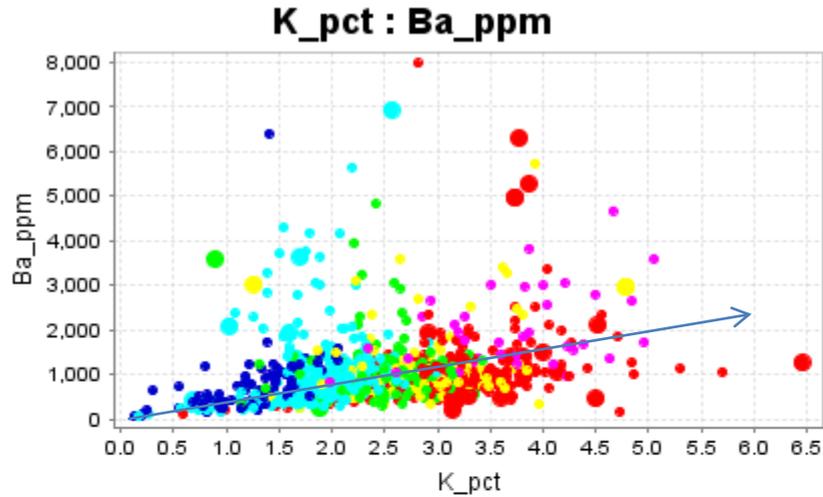
# Thallium Enrichment.

This plot shows potassium versus thallium for ALL samples. The next plot is a zoom into the lower thallium ranges.



Colour
- Strong Sericite
- Moderate Sericite
- Weak Sericite
- Sericite Albite
- Albite
- Alkali Feldspar
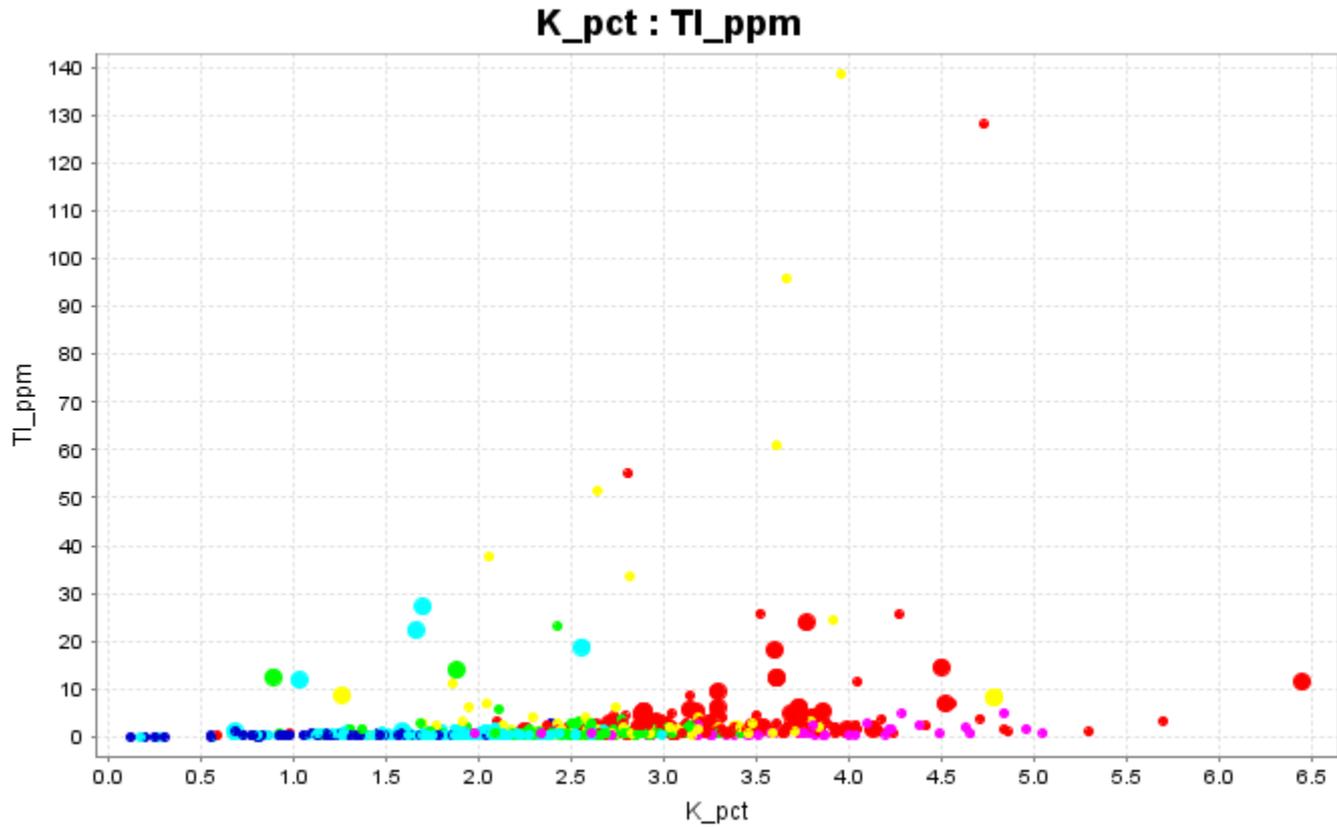
# Thallium Enrichment.

The correlation trend here is due to thallium substituting for K in silicate minerals, mostly sericite. The points lying above this trend have thallium-bearing pyrite. It is important to note that Tl values > 1.5ppm are very significant. The detection limit for thallium via ICP-MS is 0.1, the detection limit for thallium via ICP-AES is 5ppm. ICP-AES is not suitable for exploration holes.

Colour
- Strong Sericite
- Moderate Sericite
- Weak Sericite
- Sericite Albite
- Albite
- Alkali Feldspar



K_pct : Tl_ppm

Thallium in pyrite
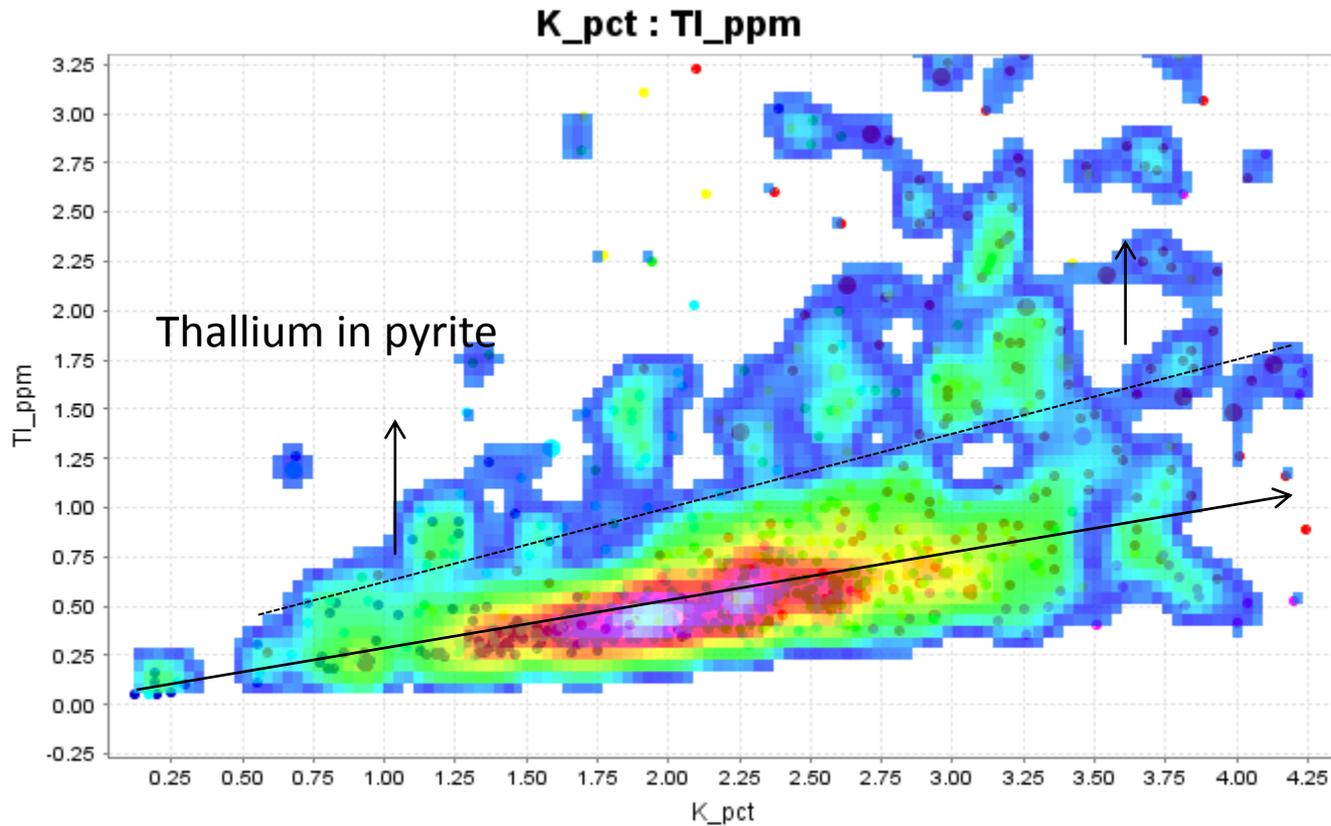
# 3D view of Thallium Distribution.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. The dashed line is the northern extension of the extension of the Rosebery sulfide position.
Thallium map; blue<1ppm, red>3ppm.
Note the distribution of ore-stage pyrite beneath the fault.

# 3D view of Silver Distribution.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. The dashed line is the northern extension of the extension of the Rosebery sulfide position.
Silver map; blue<0.1ppm, red>1ppm.

# 3D view of Arsenic Distribution.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. The dashed line is the northern extension of the extension of the Rosebery sulfide position.
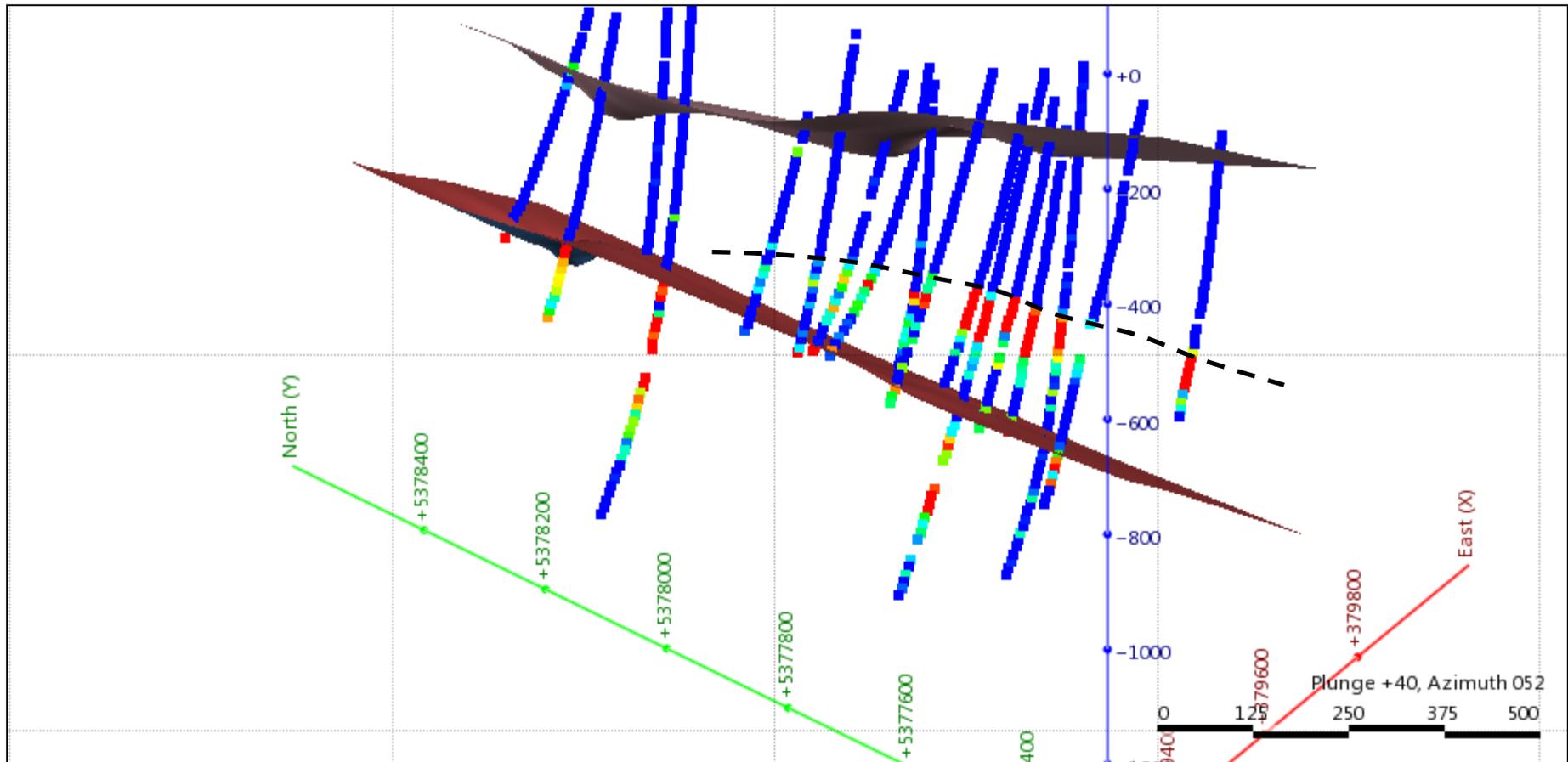Silver map; blue<5ppm, red>50ppm.

# 3D view of Antimony Distribution.

This is a view looking obliquely down the Rosebery Fault towards the north-east. The two surfaces shown here are the Rosebery Fault and the Mount Black Fault. The dashed line is the northern extension of the extension of the Rosebery sulfide position.
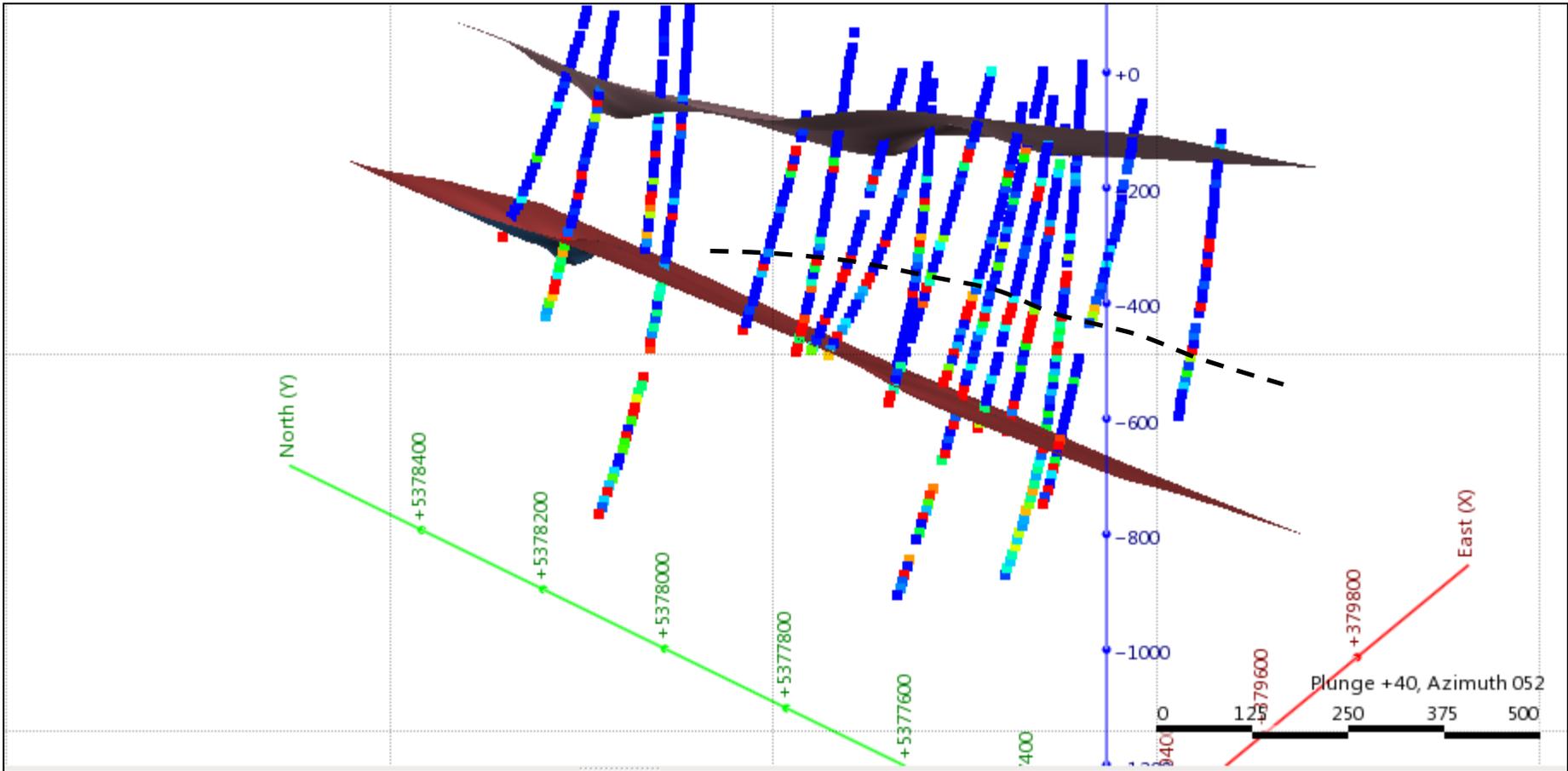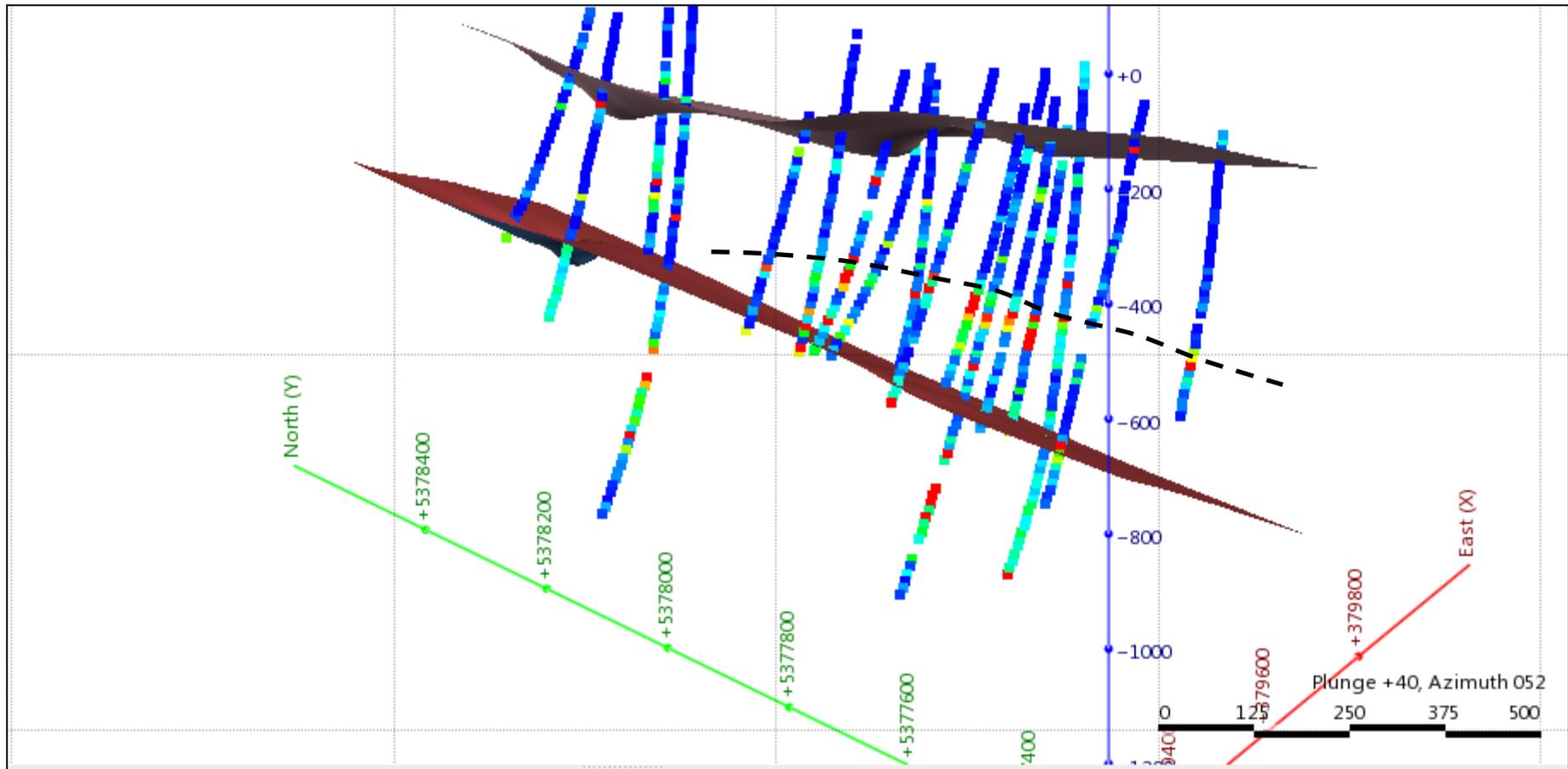Silver map; blue<1ppm, red>10ppm.

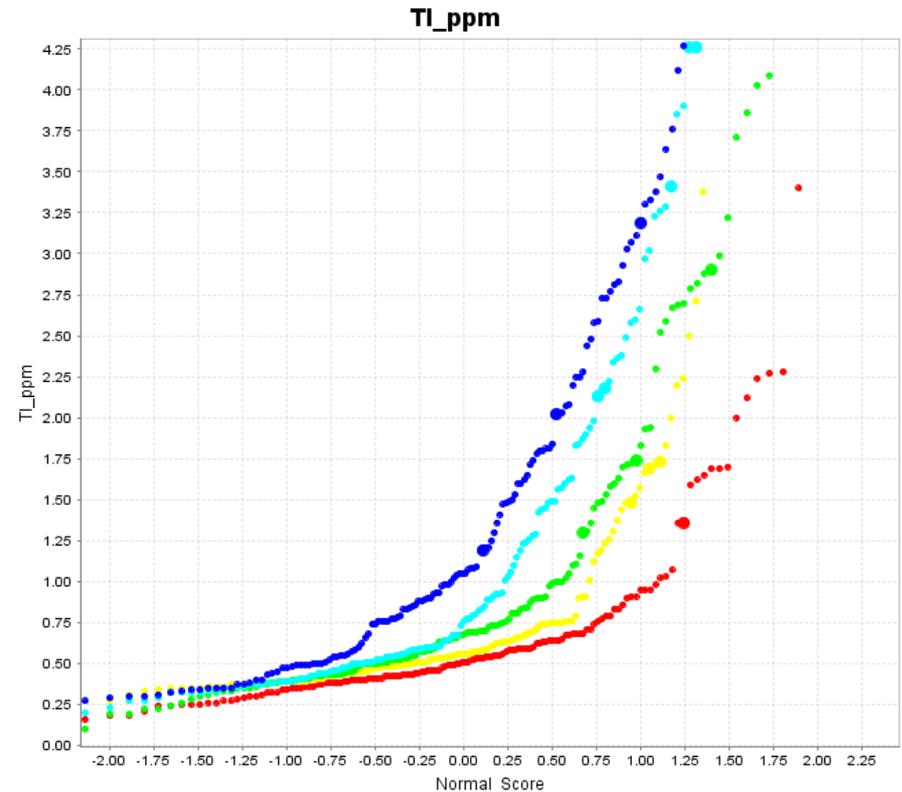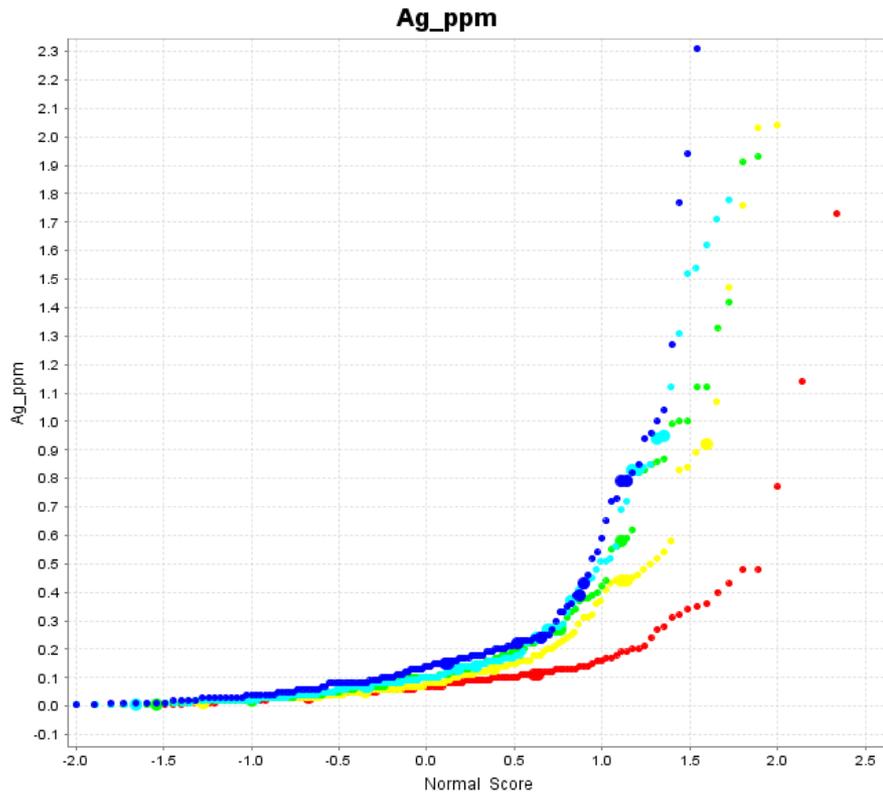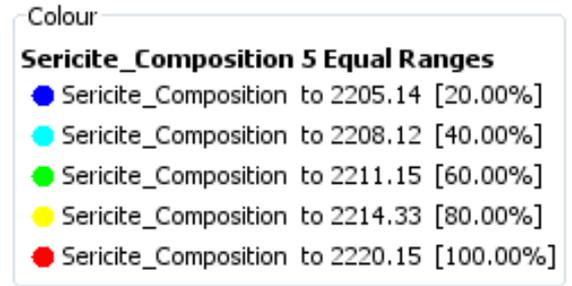# White Mica compositions on a K/Al vs Na/Al molar ratio plot.

On this version of the K/Al vs Na/Al molar ratio plot, the points are coloured by the wavelength of the 2200nm feature measured for the white micas in that sample, using the ASD. Points on the albite-muscovite tie line are blue (short wavelength). Points on the phengite-albite tie line are red.



Feldspar Na-K GER Diagram
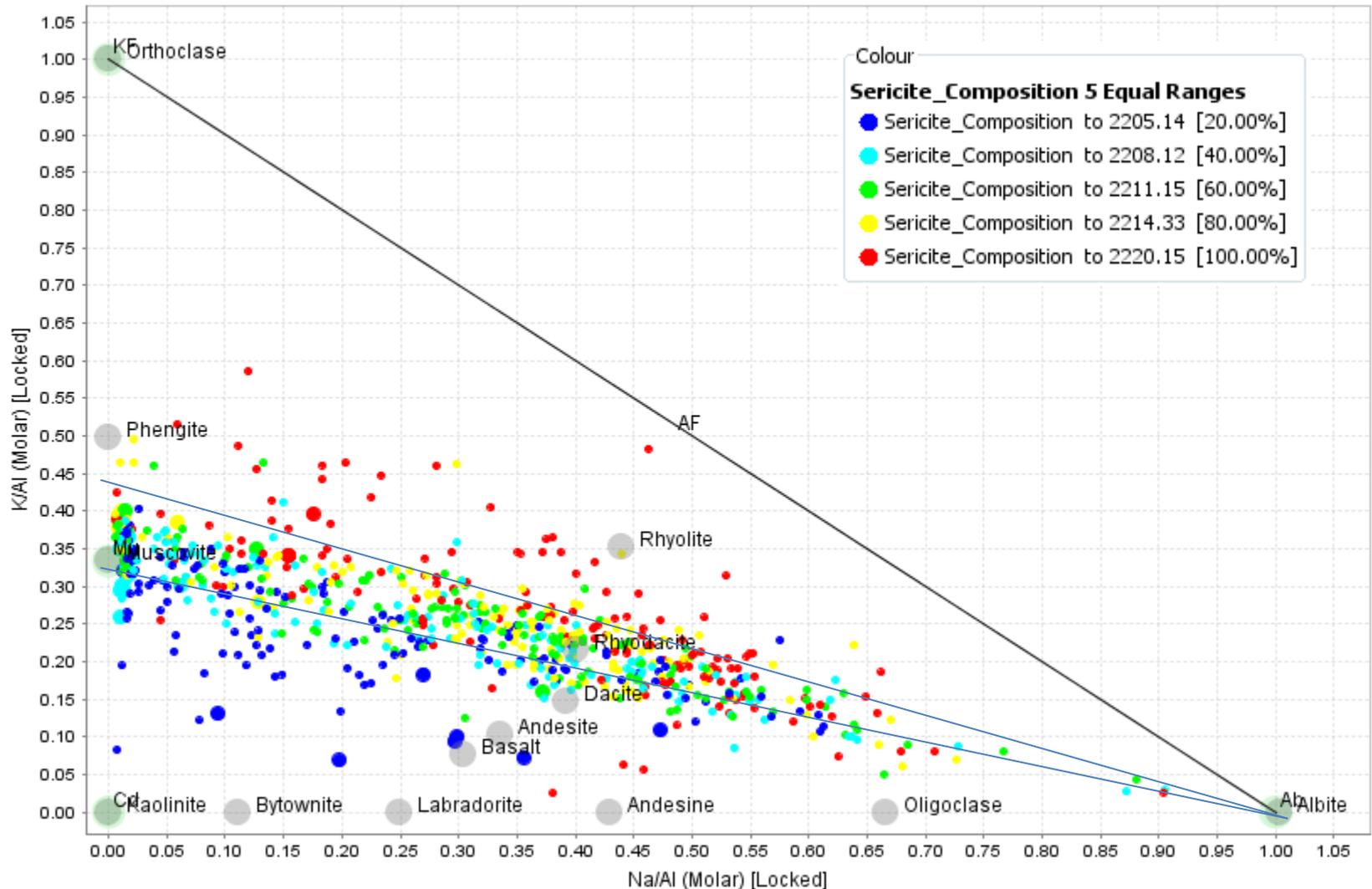
# Probability plots of pathfinder elements.

These probability plots show the partitioning of pathfinder elements with respect to different white mica wavelengths. High thallium and silver occur with short wavelength sericite types (muscovite).



Colour

**Sericite_Composition 5 Equal Ranges**
- Sericite_Composition to 2205.14 [20.00%]
- Sericite_Composition to 2208.12 [40.00%]
- Sericite_Composition to 2211.15 [60.00%]
- Sericite_Composition to 2214.33 [80.00%]
- Sericite_Composition to 2220.15 [100.00%]

# 3D view of White Mica Wavelengths.

The Rosebery footwall alteration shows up as a zone of moderately short wavelength sericite, with a plume of long wavelength sericite in the hangingwall.  Short wavelength white micas are much more widespread under the Rosebery Fault!!

blue<2200nm, red>2215nm.